

What is claimed is:

1. An annuloplasty method comprising the steps of:
  - providing clips each having two end points which are separated from each other when the clip is in an open configuration and tending to return to a naturally closed configuration by reducing distance between said end points when in said open configuration; and
    - placing said clips around an annulus by causing both of the two end points of each of said clips in said open configuration to penetrate tissue of said annulus at two circumferentially separated positions, whereby said clips reduce diameter of said annulus.
- 10 2. The method of claim 1 wherein one of said two end points of each of said clips is connected through a flexible member to a tissue-piercing needle and said clips are placed around the annulus each by causing the associated one of the needles connected thereto to penetrate the tissue at one position and to come out thereof at another position which is circumferentially separated from said one position.
- 5 3. The method of claim 1 wherein said clips are loaded in a clip delivery device, a specified number of said clips being pushed out of said delivery device at a time, each of said clips having both end points thereof to penetrate said tissue simultaneously.
4. The method of claim 1 wherein said clips are each generally U-shaped when in said open configuration, comprising a wire of a shape memory material.
5. A clip delivery device for annuloplasty, said device comprising:
  - a plurality of clips each having two end points which are separated from each other when in an open configuration and tending to return to a naturally

closed configuration by reducing distance between said end points when in said

5 open configuration;

a clip-holder supporting said clips in said open configuration; and

a pusher for pushing a specified number of said clips at a time by causing  
said two end points thereof to leave said device simultaneously together.

6. The device of claim 5 further comprising an outer tube extending  
in a longitudinal direction and having an elongated slit at one end, said pusher  
being elongated and adapted to slide in said longitudinal direction inside said  
outer tube and to thereby push said specified number of clips at a time through  
5 said slit.

7. The device of claim 6 wherein said clip-holder comprises:

a pair of cylindrical cartridges coaxially disposed with a gap therebetween  
and adjacent said slit, said clips being mounted in said open configuration to said  
cartridges, said gap being wide enough to allow only said specified number of  
5 said clips to pass therethrough at a time to be pushed out of said device together;  
and

a pair of springs for pushing said clips over and along said cartridges  
towards said gap.

8. The device of claim 5 wherein said clips are each generally U-  
shaped when in said open configuration, comprising a wire of a shape memory  
material.

9. A mitral valve repair method comprising the steps of:

providing clips each having two end points which are separated from each  
other when in an open configuration and tending to return to a naturally closed  
configuration by reducing distance between said end points when in said open  
5 configuration;

placing an annuloplasty ring about an annulus; and  
attaching said ring around said annulus by causing said clips to pass  
through said ring.

10. The repair method of claim 9 wherein said clips are attached to  
said ring in circumferential directions along said ring.

11. The repair method of claim 9 wherein each of said clips has a  
tissue-penetrating needle releasably attached through a flexible member to one of  
said two end points thereof and said step of attaching said ring comprises the  
steps of:

5 causing the needle associated with said each clip to penetrate and pass  
through said ring and tissue of said annulus; and  
thereafter pulling said flexible member to position said each clip so as to  
hold said ring to said tissue.

12. The repair method of claim 11 wherein said needle is caused to  
pass through said ring at two positions separated by a shorter distance, to  
penetrate said tissue at one position and to come out therefrom at another  
position separated from said one position by a larger distance than said shorter  
5 distance.

13. The repair method of claim 9 wherein said clips are each generally  
U-shaped when in said open configuration, comprising a wire of a shape memory  
material.

14. The repair method of claim 9 wherein each of said clips has a  
tissue-penetrating needle releasably attached through a flexible member to each of  
said two end points thereof and said step of attaching said ring comprises the  
steps of:

5 causing each of the needles of each of said clips to penetrate and come out of the annulus and to pass through said ring; and thereafter pulling the flexible members to position said each clip so as to hold said ring to said tissue.

15. A mitral valve replacement method comprising the steps of:  
providing clips each having two end points which are separated from each other when in an open configuration and tending to return to a naturally closed configuration by reducing distance between said end points when in said open  
5 configuration;  
removing mitral valve portions to be replaced;  
placing a prosthesis sewing cuff therefor where said valve portions have been removed;  
attaching said prosthesis sewing cuff to a tissue around said removed  
10 valve portions by causing said clips to penetrate both said prosthesis sewing cuff and said tissue.

16. The replacement method of claim 15 wherein each of said clips has a tissue-penetrating needle releasably attached through a flexible member to one of said two end points thereof and said step of attaching said prosthesis sewing cuff comprises the steps of:  
5 causing the needle associated with said each clip to penetrate and pass through said prosthesis sewing cuff and tissue of said annulus; and thereafter pulling said flexible member to position said each clip so as to hold said prosthesis sewing cuff to said tissue.

17. The replacement method of claim 15 wherein each of said clips has a tissue-penetrating needle releasably attached through a flexible member to each of said two end points thereof and said step of attaching said prosthesis sewing cuff comprises the steps of:

5           causing the needle associated with said each clip to penetrate and pass through said prosthesis sewing cuff and tissue of said annulus; and thereafter pulling said flexible member to position said each clip so as to hold said prosthesis sewing cuff to said tissue.

18.       The replacement method of claim 15 wherein said clips are each generally U-shaped when in said open configuration, comprising a wire of a shape memory material.

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